



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

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EDS MEMO: 05-07

MEMORANDUM TO: All Holders of the NCBDS Manual

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DATE: July 11, 2005

SUBJECT: BOX BEAM DESIGN

The latest version of the NCDBS Program has been released. This version includes the capability to design box beams. The following information describes how to run the program for box beams.

Box beams are designed using the PSG design program under the Non-Standard Strand Analysis dialog box by completing the following steps:

- Enter all alignment information and execute the layout program.
- From the PSG design dialog open the DF & Loads dialog box and store the default loads and distribution factors for each span.
- On the PSG design dialog box select the Fix Pattern button to display the Non-Standard Stand Analysis dialog box.
- Select Initial Trial Pattern.

Based on the design span length a preliminary strand pattern and concrete strengths (initial and 28 day) will be selected from a library. This is only a preliminary design, so the designer should optimize the strand arrangement and concrete strengths to attain the most economical design. Complete the design by executing the PSG design program in the Non-Standard Strand Analysis dialog box.

All Holder of the NCBDS Manuel

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This version of NCBDS also includes the capability to design box beams for top-down construction. To run the program for top-down construction, complete the following steps:

- On the PSG design dialog box check the toggle for Top-Down Construction and open the DF & Loads dialog box.
- Obtain and store the default loads and distribution factors for each span.
- On the PSG design dialog box click on the Fix Pattern button and select the Initial Trial Pattern button.
- Click on the Construction Load Analysis button to launch the Live Load Analysis dialog box.

The Live Load Analysis program will run four different anticipated live load cases - three static and one dynamic. The live load cases are selected based on the span length and are listed under *To Analyze*. Clicking on any of the cases will provide a graphic of the loading case. Hit the execute button to run the program. The Live Load Report lists the live load cases and generates the live load moments and shears that are required for the PSG design program. After generating the live load cases, execute the PSG design program from the Non-Standard Stand Analysis dialog box to obtain a design output for top down construction loads and the HS-20 loading.

If the designer desires to include the Non-composite dead load for the top down construction analysis, the "Include NCDL(Top Down)" toggle should be checked. This toggle button can be found under the tree control "SETTING" and "OPTION & TOGGLE".

The PSG program recalls only the last live load analysis run. Any modifications to a box beam design, (e.g. strand pattern, debond length, span) will require running the Live Load Analysis program prior to completing the box beam design.

GM/PK/DAS